CHAPTER IV

LAND USE AND CROPPING PATTERN

4.1 Introduction

Land is a basic and indispensable resource for agriculture. Its quality and extent largely determine the variety and magnitude of agriculture production. Extreme focus perhaps on crop yields and cropping pattern which have recorded share changes in recent years and a relatively static situation in the various uses of land are responsible for this neglect (Nadkarni and Deshpande, 1979).

The present chapter aims to analyse changes in land use and cropping pattern with the help of maps and tables, in the study area at the tahsil levels the quinquennial average for the period of 1980-85 and 2000-05 have been abstracted in order to avoid fluctuations in the climatic variables.

4.2 General Land Use

Land is necessary for human survival, because it provides man with living space, with food and with a number of raw materials which are used to satisfy his wants. Man uses land within several frameworks i.e. physical, social and economic, which often operate together. The land utility depends upon the soil, topography, climate and water resources. Therefore, the agricultural activities of man are restricted on the land surface.

Land use is a geographical concept since it involves specific areas. The study of land use in its spatial context is essential to understand the regional zonation of the areas of optimum land use, degraded areas etc. The utilization of land for different purposes indicates an intimate relationship between prevailing ecological conditions and man. The efficient use of land depends on the capacity of
man to utilize the land in proper perspective (Shinde, et.al., 1987). The land use pattern for the present study means the proportion of area under different land uses at a point of time.

The utilization of surface for all developed and vacant land on specific space at given time is called land use. Land is used for the purposes such as crops, forests, pastures, mining and transportation where as it is used for residential, recreational, industrial and commercial use. Land use is also related to conversion of land from one major use to another general use.

Land use is humanized form of earth surface synthesizing physical, chemical, biological system and process together with socio-economic transformation and behaviour in space and time. The monitoring of this complex system includes the diagnosis and prognosis of changes in man-land interaction in a holistic manner at various levels. Land use change may be examined by considering conversion of forest to crop and range land, loss of productive land through various factors, conversion of wet lands to agriculture and urban use, and conversion of other types of land to various human uses etc. (Stamp, 1984).

In many schemes, activity on land has been the major criterion for classifying land use which essentially a qualitative rather than quantitative variable. Land classification is based largely on the quality and intensity of the use of land (Mohammad Ali, 1978). Census of India has classified land utilization in nine different categories.

Five major categories of land use pattern are mentioned in the Season and Crop Report of Maharashtra state, these are as follows:

1. Area under forest.
2. Land not available for cultivation including,
   i) Barren and uncultivable land.
   ii) Land put to non agricultural uses.
3. Other Uncultivated land (excluding fallow)
   i) Culturable waste land.
   ii) Permanent pastures and grazing land.
   iii) Land under miscellaneous trees, crops and groves.
4. Fallow lands including,
   i) Current fallows
   ii) Other fallows.
5. Cropped area including,
   i) Net sown Area (NSA).
   ii) Area sown more than once.
   iii) Gross cropped area (GCA).

The land in the study region has been divided into following five major land use categories
1. Area under forest.
2. Land not available for cultivation.
3. Other uncultivable land excluding fallows.
4. Total fallow lands.
5. Net sown area.

Table 4.1
South Konkan of Maharashtra: General Land Use Pattern
(1980-85 and 2000-05)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Major land use categories</th>
<th>Area in ‘00’ hectare</th>
<th>% to total geographical area</th>
<th>% of volume of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Area under forest</td>
<td>386</td>
<td>444</td>
<td>3.02</td>
</tr>
<tr>
<td>2.</td>
<td>Land not available for cultivation</td>
<td>3690</td>
<td>3620</td>
<td>28.86</td>
</tr>
<tr>
<td>3.</td>
<td>Other uncultivable land excluding fallow</td>
<td>3475</td>
<td>3169</td>
<td>27.18</td>
</tr>
<tr>
<td>4.</td>
<td>Total fallow land</td>
<td>1758</td>
<td>1779</td>
<td>13.75</td>
</tr>
<tr>
<td>5.</td>
<td>Net sown area</td>
<td>3477</td>
<td>4190</td>
<td>27.19</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>12786</td>
<td>13202</td>
<td>100.00</td>
</tr>
</tbody>
</table>

4.2.1 Area under Forest

The area under forest includes all lands which are under forest, whether private or state owned. There is close association between the nature of the terrain, the amount of rainfall received and the area under forests (Diddee, et al., 2002).

In the study region the area under forest was 3.02 per cent (38600 hectares) during the year 1980-85 (Fig.4.1 A). For the period of 2000-05 it has increased by 0.34 per cent (Table 4.1, Fig. 4.2 B.). The Kankawali tahsil recorded high proportion (10.62 per cent) during 1980-85 followed by Kudal (9.77 per cent) and Sawantwadi (8.72 per cent) tahsils. Some tahsils like Dapoli, Lanja have recorded moderate concentration of area under forest (1 to 2 per cent). The remaining tahsils namely Chiplun, Sangameshwar, Guhagar, Ratnagiri, Devagad and Malawan tahasils have recorded very low concentration of area under forest.

During 2000-05, the situation remained moreover constant. The Mandangad, Dapoli, Guhagar, Ratnagiri and Malwan tahsils have recorded low concentration of forest land. This part of region has been denuded the forest cover due to constant overgrazing, excessive and unplanned cutting of trees and lack of forest management.

Volume of change in area under forest during the period under review is depicted in Fig. 4.2.B. Although no large scale changes are marked in the pattern, the region has undergone some changes in the forest cover, varying from 3.84 per cent increase in Devagad tahsil and 4.13 per cent decrease in Vaibhavwadi tahsil. The overall increase in forest area is 0.34 per cent only which is insignificant.

4.2.2 Land Not Available for Cultivation

The area under non-agricultural uses includes the area under settlements, roads, railways, embankments, canals, tanks etc.
This category of land in the region covers 27.42 per cent land (Fig.4.3). In the study region the land not available for cultivation was 28.86 per cent during 1980-85. It has decreased by 1.44 per cent (Table 4.1) during study period. The regional variation of land not available for cultivation is shown in Fig.4.3.A. There are notable changes in the distribution of land under this category. Most of the land in Rajapur, Devagad, Malwan and Kudal tahsils are stony wastes. The maximum land, about 42.76 per cent of Devgad tahsil is not available for cultivation followed by Rajapur (35.66 per cent), Malwan (33.28 per cent) and Kudal (20.51 per cent) tahsils during 1980-85.

The spatial distribution of volume of change in land not available for cultivation as depicted in Fig.4.3.B is uneven. Most of the increase in area involved in change is noted in Vaibhavawadi (21.15 per cent) and Dodamarg (37.17 per cent) tahsils. Except these tahsils Ratnagiri (12.28 per cent), Khed (4.69 per cent) and Kudal (4.55 per cent) tahsils have recorded increase of land under this category. Maximum decrease under this category is confined to coastal area such as Guhagar (7.26 per cent), Rajapur (22.19 per cent) and Vengurla (8.03 per cent).

4.2.3 Other Uncultivated Land Excluding Fallow:

The culturable waste land, permanent pastures land and land under miscellaneous tree crops and groves are considered as other uncultivated land. Culturable waste land includes the land which can be brought under cultivation for some times but which has been not cultivated successively for more than five years. The category of miscellaneous tree crops includes lands under casuarina trees, thatching grass, bamboo bushes or other trees used for fuel etc. Actually these are the lands which are put to some agricultural use but said area extent is not included in the category of net area sown.
Total area under this category recorded is 24.00 per cent (Table 4.1, Fig.4.1A). The areal distribution under this category varies from 15.99 per cent to 40.42 per cent (Fig.4.4). Kudal tahsil (40.42 per cent) has recorded highest percentage of area under this category followed by Khed (37.40 per cent), Sangameshwar (34.05 per cent) and Guhagar (33.33 per cent) tahsils. The remaining tahsils excepting Malwan (15.99 per cent) have moderate proportion of land under this category. The tahsils have relatively higher proportion of these lands mainly due to culturable waste; Grazing lands (Gayran's) hilly areas with thin cover are included in this category.

The volume of change in this category is shown the Fig.4.4.B. The Kanakawali tahsil has shown an increase (above 10 per cent) in area under this category followed by Vaibhavawadi and Dodamarg tahsils, whereas most of decrease (above 10 per cent) is recorded in Kudal, Devgad and Khed tahsils.

4.2.4 Fallow Land

Unlike the other agriculture related uses, fallow lands are regular part of the cultivated land on which cultivation has been temporarily suspended due to some reasons. Fallowing is either enforced by unfavourable weather conditions like droughts and floods due to which land just cannot be sown or seeding get destroyed or farmers resort to fallowing because returns from cultivation of the involved land may be too low and hence the work uneconomic, or if they lack the necessary where withal for taking up cultivation of such lands (Sharma, 1999). If the land remains fallow for only the current year, it is recorded as current fallows (ICAR, 1980). The other fallow lands include all land which are used for cultivation, but are temporarily unsown for a period of not less than one year and not more than five years. For present study these two categories are grouped together.
Total area under this landuse category is 13.48 per cent (Table 4.1, Fig.4.1.B). Areal distribution under this category varies from 10 to 20 per cent (Fig.4.5.A). Proportion of land under this category is relatively high (Above 20 per cent) in Sangameshwar, Lanja, Vaibhavwadi and Dodamarg tahsils. Due to the rugged nature of terrain, the lands are kept fallow to enrich soil fertility. Mandangad, Chiplun, Rajapur, Kankawali and Vengurla tahsils have recorded low proportion (below 10 per cent).

Volume of change in this category is uneven (Fig.4.5.B). Sangameshwar and Vaibhavawadi have shown high increase (above 10 per cent) in area under fallow land due to unremunarative nature of cultivation and deforestation. Where as Mandangad tahsil has shown high decrease (above 10 per cent) of area under fallow land due to increase in net sown area.

4.2.5 Net Sown Area

The extent of cropped lands in any region determined by net sown area and fallow lands of that region which is of vital significance in studies related to agricultural geography. The net sown area is the actual area under crops in the same year. Table 4.1, Fig.4.6 reveals spatio-temporal distribution of net sown area which has been influenced by physiographic constraints. This category has occupied about 27.19 per cent area during 1980-85 and 31.74 per cent area during 2000-05 .The Mandangad tahsil has recorded high proportion (67.84 per cent) followed by Chiplun (51.12 per cent) and Vengurla (43.99 per cent) tahsils. The remaining tahsils have recorded moderate proportion of net sown area. It is due to rugged terrain, poor soils and scarcity of water supply coupled together with poorly developed transport network and low technological development.
The spatial distribution of volume of change in net sown area as depicted in Fig. 4.6.B is uneven. The Mandangad tahsil has shown an increase (above 6 per cent) in area under this category followed by Khed, Chiplun, Guhagar, Sangameshwar, Devagad, Kudal and Vengurla tahsils. This is due to technological innovations used by farmers (based on questionnaire and personal interviews). The maximum decrease (above 6 per cent) under this category is confirmed to some tahsils such as Dapoli and Ratnagiri. This can be well attributed to the area increased under settlement, industry and roads.

4.3 Cropping Pattern:

Cropping pattern means the proportion of area under various crops at a point of time. Cropping pattern is however, a dynamic concept as it changes over space and time. The cropping pattern of a region is closely influenced by the geo-climatic, socio-cultural, economic, historical and political factors (Husain M., 1996). The cropping pattern is influenced by the physical factors such as soil, climate; technological factors like irrigation, improved varieties of seeds, availability of fertilizers, and plant protection chemicals; institutional factors like land reform, consolidation of holdings, credit facilities, price structure, procurement policies, and storage facilities (Shafi, 2006). Climate plays a crucial role in determining the existing cropping pattern. From the time the crops are sown, till the produce is harvested and stored they are more or less at the mercy of the climate. Any abnormalities in the climate during the growing season, such as delay in the outbreak of rains, dry spells or access rains, too high or too low temperatures would seriously affect the growth and final yield of the crop. The cropping pattern vary from region to region due to the variation in the terrain, slope, temperature, amount and reliability of rainfall, soils, availability of water for irrigation, use of fertilizers, pesticides and mechanization.
Changes in cropping pattern refer to changes in proportion of area under different crops at two different times. Such changes, though governed by ecological situation, socio-economic and technological factors also determine which of the feasible crops the farmers will choose. The ensuing section therefore, deals with the cropping pattern and changes their in for individual crops in general and irrigated crops in particular in the region. In this chapter the overall cropping pattern of the study region is outlined, followed by the discussion of the area under individual crops. The table given below shows the changes in cropping pattern under each crop in South Konkan during 1980-85 and 2000-05.
### Table 4.2
**South Konkan of Maharashtra: Temporal changes in Cropping Pattern**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crops</th>
<th>1980-85</th>
<th>2000-05</th>
<th>Change in per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Area in '00' ha</td>
<td>Area in '00' ha</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>per cent</td>
<td>per cent</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Rice</td>
<td>1472</td>
<td>1569</td>
<td>-3.91</td>
</tr>
<tr>
<td>2.</td>
<td>Ragi(nagali)</td>
<td>95</td>
<td>223</td>
<td>2.65</td>
</tr>
<tr>
<td>3.</td>
<td>Vari</td>
<td>111</td>
<td>71</td>
<td>-1.42</td>
</tr>
<tr>
<td>4.</td>
<td>Kodra</td>
<td>18</td>
<td>9</td>
<td>-0.30</td>
</tr>
<tr>
<td>5.</td>
<td>Other Cereals</td>
<td>440</td>
<td>40</td>
<td>-11.41</td>
</tr>
<tr>
<td>6.</td>
<td>Total Cereals</td>
<td>2136</td>
<td>1912</td>
<td>-14.39</td>
</tr>
<tr>
<td>7.</td>
<td>Total Pulses</td>
<td>87</td>
<td>125</td>
<td>0.54</td>
</tr>
<tr>
<td>8.</td>
<td>Total Food grains</td>
<td>2223</td>
<td>2037</td>
<td>-13.85</td>
</tr>
<tr>
<td>9.</td>
<td>Total Condiments and Spices</td>
<td>23</td>
<td>0.65</td>
<td>20</td>
</tr>
<tr>
<td>10.</td>
<td>Mango</td>
<td>92</td>
<td>339</td>
<td>5.51</td>
</tr>
<tr>
<td>11.</td>
<td>Cashew</td>
<td>141</td>
<td>461</td>
<td>7.04</td>
</tr>
<tr>
<td>12.</td>
<td>Other Fruits and Vegetables</td>
<td>16</td>
<td>0.45</td>
<td>28</td>
</tr>
<tr>
<td>14.</td>
<td>Total Food Crops</td>
<td>2495</td>
<td>2885</td>
<td>-1.25</td>
</tr>
<tr>
<td>15.</td>
<td>Total Oil Seeds</td>
<td>122</td>
<td>181</td>
<td>0.89</td>
</tr>
<tr>
<td>16.</td>
<td>Fodder and Miscellaneous</td>
<td>942</td>
<td>1124</td>
<td>26.83</td>
</tr>
<tr>
<td>17.</td>
<td>Total Non Food Crops</td>
<td>1064</td>
<td>1305</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>Gross Cropped Area</td>
<td>3559</td>
<td>4190</td>
<td>14.02</td>
</tr>
</tbody>
</table>

Rice:

Rice is an important crop within all cereals. It is the traditional important staple food crop in the region. It requires the temperature of $21^\circ$C during sowing and $37^\circ$C during harvesting. It requires high rain fall or assured irrigation facilities. Rice cultivation in South Konkan requires large amounts of human labour and relatively small amounts of capital to produce a grain. This is main crop for the sustenance of the farmers and their family in the study region.

Although rice is grown widely throughout South Konkan, the great bulk of its production comes from a few major areas where conditions are more favourable. It indicates that the spatial distribution of rice is strongly influenced by the physiography of the region.

Rice occupies about 37.45 per cent (Table 4.2) of total cropped area having more variations at tahsil level. It ranges from below 25 per cent to over 50 per cent in some tahsils (Fig. 4.7 A). The tahsils in Sindhudurg districts (excluding Vengurla) have recorded the highest area (over 50 per cent) under rice. It is followed by Dapoli, Khed, Ratnagiri, Sangmeshwar, Lanja, Rajapur and Vaibhavwadi tahsils of Ratnagiri district. This zone has 25 to 50 per cent of the total cropped area under rice, where physical conditions are particularly favourable for rice cultivation. Rest of the region has below 25 per cent area under rice.

The uneven distribution of area under rice is largely governed by environmental factors. Low concentration of area under rice is generally observed where the soils are shallow, intensely leached, heavily eroded and therefore relatively infertile. These are the varkas soils typical on hill slopes occupying mal lands in Ratnagiri district. Further a considerable proportion of the coastal tracts area meanaced by the ingress of sea water. In this way regional contrasts in a real
concentration of rice can be explained in terms of favourable edaphic and water supply conditions.

The figure 4.7 B indicates volume of change in rice cultivation during the twenty five years from 1980-85 to 2000-05.

Decrease in area under rice is instantly noticeable (Region average – 3.91 per cent). Only four tahsils record an increase. Lanja tahsil registered over 20 per cent increase. Dapoli, Ratnagiri tahsils have recorded moderate (10 to 20 per cent) proportion, whereas very low share is confined in Sawantwadi tahsil (Fig.4.7 B). Introduction of high yielding varieties and attractive prices have encouraged the rice cultivation.

On the contrary, the tahsils of decreasing concentration are many (13 tahsils) and area involved in decrease varies from below 10 per cent to over 20 per cent. A major decrease (above 20 per cent) is confined to two tahsils viz. Khed and Vengurla. Decrease in area to the volume of 10 to 20 per cent is noted in Chiplun, Vaibhavwadi and Kudal tahsils. Whereas decrease in area to the volume of below 10 per cent is more common and it is observed in Sangameshwar, Rajapur, Devagad, Malwan, Kanakawali and Dodamarg tahsils.

Thus overall decrease in area under rice in South Konkan is due to adoption of fruit and fodder crops by farmers.

**Ragi:**

Ragi is the staple food of the poor classes in region. It is a Kharif food grain crop. Nachni or Nagali are the local names of this crop. It is a short duration crop and permits intercropping with other kharif crops. It is usually grown on lighter hilly soils which are unsuitable to grow anything else. Varkas lands of the South Konkan, hill slopes soil provide the ideal conditions for ragi cultivation.

About 5.32 per cent (Table 4.2) of the total cultivated area in a region is under ragi. Dapoli, Guhagar and Ratnagiri, tahsils have
recorded higher proportion of ragi cultivation i.e. above 10 per cent (Fig. 4.8 A). Sangameshwar, Lanja, Vaibhavwadi and Dodamarg tahsils record 5 to 10 per cent. Relatively lower concentration of ragi (below 5 per cent) is found in rest of tahsils of Ratnagiri and Sindhudurg district.

Figure 4.8 B, shows volume of change in ragi cultivation during the period. Positive change i.e. increases in area is marginal being 2.65 per cent. Dapoli, Guhagar and Ratnagiri tahsils registered above 10 per cent increase. Increase from 5 to 10 per cent is observed in Sangameshwar and Lanja tahsils. The increase under 5 per cent is observed in Mandangad, Khed, Chiplun and Rajapur tahsils. This is due to the application of improved seeds. Decrease in area is observed in tahsils of Sindhudurg district. The maximum negative change observed in Devagad tahsil is above 10 per cent. The tahsils recording medium fall in area under ragi are Kanakawali, Malwan and Sawantwadi (5 to 10 per cent). Rest of tahsils of Sindhudurg district recorded below 5 per cent of volume of change. Decrease in area under ragi indicates the changing tendency of farmers to grow other commercial crops.

Other Cereals

Except rice, ragi, vari the study region produces other cereals in a less amount such as maize, sawa (harik), kodra etc. The spatial distribution of other cereals (Fig 4.9 A) in study region shows that it covers only 0.95 per cent cultivated area in 2000-05. Above 2 per cent area under other cereals found in Dapoli (3.67 per cent), Guhagar (3.20 per cent), Ratnagiri (2.02 per cent), and Rajapur (2.17 per cent) tahsils. Remaining tahsils noted below 2 per cent cultivated area under other crops. The low concentration of other cereals is mainly due to low yield.

Figure 4.9 B shows volume of change in South Konkan (-11.41 per cent) in area under other cereals. The pockets Mandangad,
Guhagar and Sangameshwar tahsils recorded major decrease (above 20 per cent) in area under other cereals followed by Dapoli, Khed, Chiplun, Ratnagiri, Lanja and Rajapur tahsils ranges from 10 to 20 per cent of volume of change. The cultivated area under other cereals indicates declining trend in these tahsils, where cashew has replaced this crop.

**Total Cereals:**

The study region also produces varieties of cereals along with rice, ragi e.g. kodra, maize etc. Total cereals occupy 45.63 per cent (Table 4.2) of the total harvested area. The regional variation in cultivation of other cereals is largely influenced by agro climatic and edaphic conditions.

The northern tahsil namely Dapoli and southern tahsils viz. Malwan, Kudal, Sawantwadi and Dodamarg occupy above 60 per cent (Fig 4.10 A) of cultivated area under total cereals where physical conditions are more favourable for growing cereal crops.

Chiplun and Vengurla tahsils have recorded low share (below 30 per cent) under cereals whereas rest of tahsils have noted moderate (30 to 60 per cent) proportion of area under these crops.

The fig. 4.10 B, reveals that hectarage under total cereals has decreased (14.39 per cent) from 60.02 per cent to 45.63 per cent during the period under investigation. Decrease in area under total cereals is instantly noticeable. Out of 17 tahsils only three tahsils namely Dapoli, Ratnagiri, Lanja have registered an increase below 20 per cent. Rest of tahsils has recorded decrease in area under cereal crops. Significant decrease over 40 per cent is observed in Mandangad and Khed tahsils. Decrease in area to the volume of 20 to 40 per cent proportion has been recorded in Guhagar, Chiplun and Sangameshwar tahsils. Below 20 per cent has been observed in other tahsils namely. Rajapur, Devagad, Malwan, Kudal, Sawantwadi and Dodamarg tahsils, It is interesting to
note that in most of tahsils cereal crops are replaced by fruit crops mainly cashew and mango.

**Food grains:**

The food grains play a major role in the cropping of land under tillage in South Konkan. It is observed that almost 48.61 per cent cropped area is under food grain crops (Table 4.2).

However there are notable regional variations in the distribution of food grains in South Konkan ranging from above 60 per cent to under 30 per cent of total cropped area (Fig.4.11 A). High percentage under food grains (60 per cent) are noted in tahsils of Dapoli in north and Malwan, Kudal, Sawantwadi and Dodamarg in South, whereas moderate concentration (30 to 60 per cent) is observed in Khed, Guhagar, Chiplun, Ratnagiri, Sangameshwar, Lanja, Rajapur, Vaibhavwadi, Devagad and Kankawali tahsils. The high concentration of food grains is mainly due to suitable physio-climatic conditions to grow traditional food grains on the one hand and less suitability to grow other commercial crops on the other hand. This is due to favourable climatic conditions which are grown traditionally.

Figure 4.11 B, shows volume of change in total food grain. The pockets such as Dapoli Ratnagiri and Lanja tahsils have noted moderate increase (12 per cent to 24 per cent).

On the other hand, the areas of decreasing concentration are observed in 14 tahsils and area involved in decrease varies from under 12 per cent to over 24 per cent. A significant decrease (over 24 per cent) is confined in Mandangad, Khed, Sangameshwar and Kanakawali tahsils followed by Guhagar, Chiplun, Rajapur, Devagad, Vaibhavwadi, Kudal and Vengurla (12 to 24 per cent). Sawantwadi and Dodamarg tahsils have recorded (below 12 per cent) decline in area under foodgrains.
Thus overall decrease in area under food in South Konkan is alarming in view of the changing cropping pattern from traditional crops to commercial.

**Cashew:**

Cashew is a traditional crop of South Konkan. The climate and soil are most suitable for growing cashew. It grows well under rain fed condition on hill slopes, varkas, light, soils up to 150 mt elevations from mean sea level.

Cashew shares about 11.00 per cent of the total cropped area (Table 4.2). However, it indicates sound position in cropping pattern. Its spatial distribution differs largely throughout the region. Relatively significant (over 20 and 10 to 20) percentage of the cultivated area under cashew is confined from the central to southern parts of the region (Fig. 4.12 A).

This is the area where government facilities are comparatively more utilized. Besides, favorable physical conditions are the other contributory factors which have stimulated the extension of cashew cultivation in this part of a region. By contrast, low proportion (below 10 per cent) is recorded in Rajapur tahsil and tahsils of northern part of a study region which is insignificant.

The period under investigation has witnessed phenomenal growth in the area under cashew which rose from 3.96 per cent to 11.00 per cent (Table 4.2) during the period under review. The significant increases over 20 per cent of the cultivated area are noted in Ratnagiri, Lanja, Kanakawali and Vengurla tahsils (Fig. 4.12). Moderate increase is observed (8 per cent to 16 per cent) in Dapoli, Vaibhavwadi and Devagad tahsils, whereas under 8.00 per cent increase in area under cashew is recorded in Mandangad, Khed, Guhagar, Sangameshwar, Rajapur, Malwan, Kudal and Dodamarg tahsils.
The significant increase in area under cashew cultivation is due to research contribution made by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli through varietal improvement and the sound propagation of technology. The State Department of Horticulture is also propagating the improved varieties. This has resulted into the grafts of high yielding varieties whereas the state government started Employment Guarantee Scheme (E.G.S.), *Phalabag Lagavad Yojana* from 1989-90. That has boosted the cashew cultivation in this area.

The area under cashew has decreased only in Chiplun and Sawantwadi (below 8.00 per cent) tahsils.

**Mango:**

Mango plantation grows well in a variety of soils from the well drained laterite soils to medium black soils. A well drained fairly deep loamy soil is considered best for mango. Average range of temperature 23°C to 31°C is considered optimum for growth of plant as well as yield. The commercial cultivation of mango is limited to an elevation of about 330 mt to 400 mt in the South Konkan (Tawade, 1976).

Mango occupies about 8.09 per cent (Table 4.2) of total cropped area in the region. Relatively high proportion of area under mango (above 10 per cent) is noted in Ratnagiri, Devagad, Kankawali and Vengurla tahsils (Fig. 4.2). Moderate proportion (5 to 10 per cent) is recorded in three pockets, comprising north most tahsils of study region viz. Mandangad, Dapoli, Khed and Guhagar (Fig. 4.13), followed by Kudal, Rajapur and Lanja tahsils. This is due to the light and porous lateritic soil and maritime climate and finance made available to the cultivators under horticultural development scheme to increase mango cultivation.

The map (Fig. 4.13) indicates that the share of mango has gone up from 2.58 per cent in 1980-85 to 8.09 per cent in 2000-05. The significant increase is found in tahsils of Ratnagiri, Devagad,
Kanakawali and Vengurla (above 10 per cent). The moderate change from 4 to 8 per cent is recorded in Mandangad, Dapoli, Khed, Guhagar tahsils, whereas Chiplun, Sangameshwar, Rajapur, Lanja, Malwan and Sawantwadi tahsils have recorded up to 4 per cent increase in area under mango.

Well drained soils, suitable temperature, heavy rainfall and attractive prices have encouraged for mango cultivation. Mango hectarage shows a declining trend only in Dodamarg tahsil which is negligible.

**Total Food Crops:**

Study region is rich for various food crops such as cereals, pulses (food grains), various fruits, vegetables, condiments and spices. The spatial distribution of the total food crops (Fig 4.14 A) in the study region shows that it covers 68.85 per cent to gross cropped area in 2000-05, while much variation lies at tahsil level. Above 80 per cent area under total food crops noted in Dapoli, Ratnagiri, Lanja tahsils in Sindhudurg district (excluding Vaibhavwadi tahsil). The high concentration of total food crops is due to suitable of rainfall and varkas soil nature.

Figure 4.14 B shows decrease (1.25 per cent) in area under total food crops in the study region in given period. Above 20 per cent positive volume of change in cultivated area under total food crops occurs in Dapoli, Ratnagiri and Lanja tahsils followed by Devagad, Kankawali and Vengurla (below 10 per cent) tahsils. The high volume of change observed due to increase in area under fruit crops i. e. cashew and mango through varietal improvement and attractive prices.

**Fodders and Miscellaneous:**

Grass is the important fodder in South Konkan. The pastures are maintained in hilly and high rainfall areas for the same purpose.
These crops together share about 26.83 per cent of the total cultivated area (Table 4.2).

The high concentration (above 30 per cent) of these crops is observed in Mandangad, Guhagar, Chiplun, Sangameshwar and Rajapur tahsils whereas moderate concentration (15 to 30 per cent) is noted in Khed and Vaibhavwadi, where grazing grounds are the main source of fodder supply. Rest of the tahsils have noted below 15 per cent area under fodder (Fig 4.15 A).

During the period under investigation only 0.36 per cent increase in area under these crops has been recorded (Fig 4.15 B). Major increase from 15 to 30 per cent is observed in northern tahsils of the region: Mandagad, Khed, Guhagar, Chiplun and Sangameshwar. Below 15 per cent increase noted in Rajapur, Vaibhavwadi, Kudal and Vengurla tahsils.

Decrease in fodder crops has occurred in Dapoli, Ratnagiri and Lanja tahsils (above 30 per cent) where cashew and mango cultivation has increased providing shoots as fodder.

**Total Non Food Crops:**

This category includes oil seeds like *til, niger* etc and fodder crops. The area under total non food crops is 31.15 per cent of the total cropped area (Table 4.2, Fig. 4.16 A). The oil seeds are grown as a mixed crop in along with rice and ragi, whereas fodders are grown in hilly areas mainly. The tahsils in Ratnagiri district, such as Mandangad (62.28 per cent), Chiplun (60.8 per cent), Guhagar (43.20 per cent), Sangameshwar (53.60 per cent) and Rajapur (50.31 per cent) occupy above 30 per cent cultivated area under nonfood crops, whereas Vaibhavwadi (29.66 per cent), Malwan (16.15 per cent) and Vengurla (17.97 per cent) tahsils show moderate cultivated area under non food crops. This is due to rugged hilly area and poor soil.
Volume of change in non food crops shows significant variations both positive as well as negative (Fig. 4.16 B). Major increase from 15 to 30 per cent is confined in Ratnagiri district including Mandangad (25.40 per cent), Khed (27.80 per cent), Chiplun (19.06 per cent), Guhagar (15.28 per cent) and Sangameshwar (17.32 per cent) tahsils. The significant decrease (above 30 per cent) in nonfood crops has occurred in Dapoli, Ratnagiri and Lanja tahsils. The other areas where low decrease (below 15 per cent) has taken place are Devagad, Kankawali and Vengurla tahsils.

**Changes in the Cropping Pattern**

A change in agricultural landuse implies a change in proportion of area under different crops at two different times (Pawar, 1989). The proportion of area under different crops at a point of time means the cropping pattern of that area. When the area under different crops changes at two different times then, it is called as change in cropping pattern. As such amount of area involved in change for each areal unit (tahsil) is calculated for individual crops of leading increase and leading decreased are marked. In order to measure the quantitative change Weavers Index (1954) is employed. Index of change in agricultural landuse = A/B

Where ‘A’ is difference of percentage of crops of increase and ‘B’ the difference of percentage of crops of decrease for the given period. This is the percentage of land which is actually involved in the change of area from one crop to other. The lower the index higher the stability and higher the index, more radical are changes in the landuse pattern (Singh, 1974). The volume of change (1980-85 to 2000-05) in the percentage for every tahsil in study region is calculated for individual crops (Fig. 4.17). These figures having positive and negative volumes stated the crops of leading increase and decrease (Fig.4.18) in each tahsil.
Volume of Change in Cropping Pattern

The index of change computed reveals three different areas of changes (Fig. 4.17).

High Area of Change

High area of change with an high dynamic swing (over 30 per cent ) is observed in Mandangad, Dapoli, Khed, Ratnagiri, Lanja, Kankawali and Vengurla tahsil, where the level of technological development is increased. The use of high yielding varieties, use of pesticides under the agricultural experts of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli are contributing factors for high area of change largely from rice, ragi to cashew and mango fruit crops.

Moderate Area of Change

The proportion of moderate change (15 to 30 per cent) is observed in Guhagar, Chiplun, Sangameshwar, Vaibhavwadi and Kudal tahsil, although these tahsils are wellknown for cultivating traditional crops like ragi, rice and other cereals.

Low areas of Change

The area below 15 per cent is observed in Rajapur, Sawantwadi, Malwan and Dodamarg tahsils where major crops of increase are traditional.

Crops of Leading Increase

In the study region cashew, ragi, rice and mango are leading crops (Fig. 4.18 A). Cashew is a major crop covers ten tahsils (47.98 per cent of study area) namely, Mandangad, Khed, Ratnagiri, Lanja, Vaibhavwadi, Kankawali, Devagad, Malwan, Vengurla and Dodamarg tahsils. The second leading increasing crop ragi indicates 39.42 per cent of study area (Dapoli, Guhagar, Chiplun, Sangameshwar and Rajapur tahsils). Rice increase in Sawantawadi tahsil (6.40 per cent of study area) and mango increases in Kudal tahsil (6.20 per cent of study area).
The change indicates that the cultivators are shifting from traditional crops to fruit crops.

**Crops of Leading Decrease**

The crops suffering the leading percentage of area decrease (Fig. 4.18 B) are ragi, rice, and other cereals. The decrease of area under these crops is 26.61 per cent, 18.12 per cent and 55.27 per cent respectively. In Ratnagiri district (excluding Khed tahsil) cereals i.e. kodra, maize, harik / sawa etc are decreased. The shift is from cereals to cashew and ragi; in Chiplun, Vaibhavwadi and Vengurla tahsils from rice to cashew; in Kudal tahsil from rice to mango; in Devagad, Malwan and Kanakawali tahsils from ragi to cashew; in Sawantwadi tahsil ragi to rice and in Dodamarg tahsil ragi to cashew. These shifts (Fig. 4.18) exhibit the beginning of a tendency reallocation of resources for a better utilization of the soil and agricultural potentials.

**Conclusion:**

The landuse pattern of the study region is the reflection of the effect of physical and socio-economic factors.

Net sown area in the region ranks first by occupying 31.79 per cent area followed by fallow land (13.46 per cant). Hence there is a large potential for brining area under cashew cultivation.

The areal extent of cashew cultivation has increased over fourfold during the period under review. Although cashew is cultivated throughout the region, the concentration is observed in few pockets. Keeping in the view the area under fallow land, there seems to be a large potential for increasing the area under cultivation which will help to increase the economic status of the region as a whole. Rice is the dominant crop occupying 37.45 per cent of the cultivable area.

The region as a whole has experienced 14.02 per cent change in the cropping pattern during the period.
The tahsilwise temporal dynamics in the cropping pattern indicates that fruit crops (cashew and mango) are leading increasing crops, whereas leading decreasing crops are mainly cereal traditional crops (ragi and rice). This is a good indication of commercialization of agriculture in the region. However, it needs to be strengthened by providing technical know-how and financial aid to the small and marginal farmer of the region.
References:


Deptt. Of Env. And Wild Life, Govt. of India, New Delhi, pp.1, 2.


